SOME NOTES ON THE SEEDLING OF HAPLOLOBUS (BURSERACEAE)

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Though the embryo provides one of the main generic characters of *Haplolobus*, up till now nothing was known about its germination or seedling (blastogeny). That is why the first author, when revising the genus *Haplolobus* (Leenhouts, 1972) contacted Mr. J. S. Womersley, Chief Division of Botany, Department of Forests, at Lae, Papua and New Guinea, and asked him for either viable seeds, or seedlings. We are very obliged to him and to the Department of Forests for providing us with both, including herbarium and spirit material of seedlings and a herbarium specimen of the parent tree. The latter was collected under nr. NGF 49210 (Henty) at Markham Point near Lae, and could be identified as *Haplolobus floribundus* H. J. Lam ssp. *floribundus* group A. The seedlings were collected 8 weeks after being sown in the Lae Botanic Garden; they were preserved under nr. NGF 49275. It is a pity that the seeds sown in the Botanic Garden at Leiden did not germinate.

DESCRIPTION OF THE SEEDLING

Germination hypogeal, the radicle emerged from the micropyle and is straight downwards, the stem grew between the two cotyledonary petioles straight upwards. Roots: primary root long, tapering, woody with numerous fibrous lateral roots distributed almost evenly down main root. Cotyledons: petioles 0.2 mm long, flattened, thick, bent to one side of the stem; lamina simple, entire, thick, plano-convex, unfolded, nearly filling the seed. Hypocotyl: very short, dark brown. Epicotyl: erect, tomentose, light brown or greenish brown, 8—13 cm long. Leaves: the first pair opposite, first internode 0.4—1 cm, subsequent two leaves alternate, all simple; petioles 0.5—1.2 cm long, light brown, tomentose; lamina 3—6.5 by 0.9—2.4 cm, oblong-ovate, entire, acuminate, tomentose especially on the veins, light green above, brownish green beneath. — *Fig. 1.*

Among the spirit material there was one fruit with two seedlings. It appeared that this fruit was 2-celled and 2-seeded. Two-seeded fruits seem to be very rare in this genus. Lam (1958, p. 261, f. 3) first reported on 2-seeded fruits in one collection (NGF 7259) of *H. leeifolius* H. J. Lam var. *anisander* H. J. Lam (this collection cited as *H. floribundus* ssp. *floribundus* group A in Leenhouts, 1972). He found as well fruits with two fertile cells each containing one seed, as fruits with a single fertile cell containing two seeds.

DISCUSSION

Our knowledge of the blastogeny of many plant groups is still very meagre, but it is extremely difficult to get an impression of how meagre it really is. Descriptions and figures

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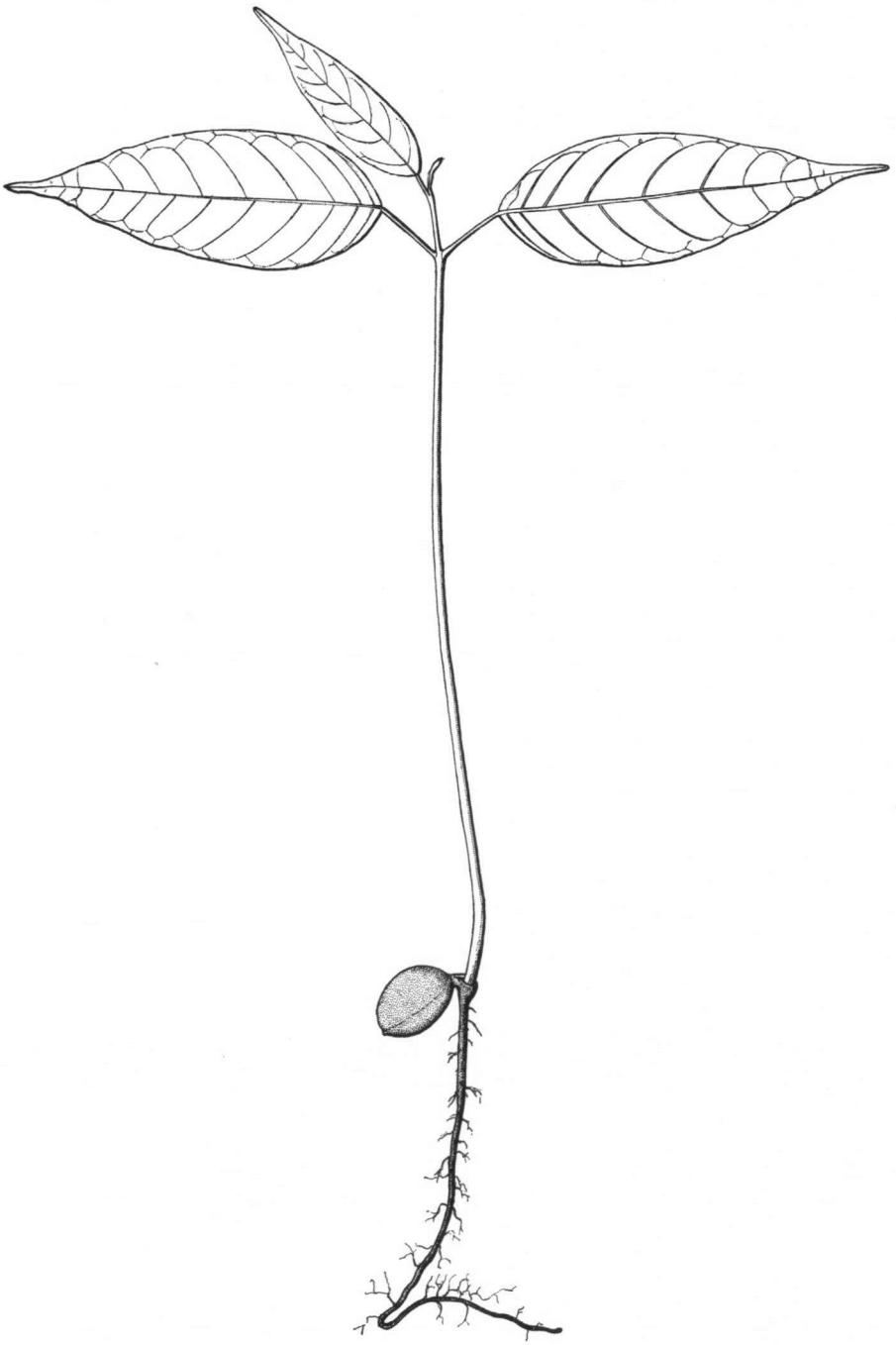

Fig. 1. *Haplolobus floribundus*, seedling. (× ½; *NGF 49275*; drawing J. H. van Os).

of germinations and seedlings are scattered all through botanical, horticultural, and silvicultural literature, often hidden in more or less popular papers. We fully agree with Burtt (1972) that a systematic bibliography to all these data would be an indispensable basis for further study in this morphologically as well as ecologically extremely interesting and important field, so much neglected up till now.

Consequently, a scanning of the literature on the blastogeny of the *Burseraceae*, in order to compare our findings with those data already known from other genera, could not be but cursory and hence probably incomplete. We found the following references:

Aucoumea: Guillaumin, 1909, p. 266—267, f. 47 (*klaineana*).

Boswellia: Guillaumin, 1909, p. 272, f. 52; 1910, f. 6; Troup, 1921, p. 174 (all *serrata*).

Bursera: Guillaumin, 1909, p. 278, f. 56 (*simaruba*); 1910, f. 3 (*sp.*); Duke, 1965, f. 69 (*simaruba*); 1969, p. 151.

Canarium: Lubbock, 1892, p. 333, f. 237 (*strictum*); Guillaumin, 1909, p. 241—247, f. 25 and 30 (*oleosum*), f. 27 (*occidentale* = *schweinfurthii*), f. 28 (*moluccanum* = *indicum*), f. 29 (*commune* = *vulgare*); 1910, f. 2 (*oleosum*), f. 13 (*occidentale* = *schweinfurthii*); Weberling & Leenhouts, 1966, p. 536—542, f. 23 (*kipella*), f. 24 and 26 vii—xi (*subulatum*), f. 25 i (*oleosum*), f. 25 ii and 26 i—vi (*vulgare*), f. 26 xii—xix (*asperum*), f. 27 (*schweinfurthii*); Fl. Mal. Bull. 12, 1966, coverplate (*oleosum*); Meijer, 1968, p. 112 and preceding unnumbered plates (*littorale*, *megalanthum*, *pseudodecumanum*).

Dacryodes: Guillaumin, 1909, p. 254—255, f. 34 (*Pachylobus edulis* = *D. edulis*); Aubréville, 1959, p. 141, f. 180 (*klaineana*); Duke, 1965, f. 71 (*excelsa*).

Garuga: Guillaumin, 1909, p. 283—288, f. 60 and 61; 1910, f. 1; Troup, 1921, p. 177 (all *pinnata*).

Protium: Guillaumin, 1909, p. 211—212, f. 3 and 4 (*javanicum*); 1910, p. 454, f. 4 (*javanicum*); Duke, 1969, p. 151.

Santiria: Guillaumin, 1910, f. 5 (*sp.*).

Tetragastris: Duke, 1965, f. 68 (*balsamifera*); 1969, p. 151, f. 31 (*panamensis*).

Of all the genera mentioned above the type of germination is epigeal or phanerocotylar (as it is termed by Duke, 1965) except in *Dacryodes excelsa* which has a hypogeal or cryptocotylar germination apparently fully comparable with that of *Haplolobus*. This character is in agreement with the doubtless relatively close relationship between these two genera, and, as both genera are considered rather highly evolved among the *Burseraceae*, it may possibly represent a derived condition. However, contrary to *Dacryodes excelsa* which represents the American section *Dacryodes*, both other species of *Dacryodes* the blastogeny of which is known, *D. edulis* and *D. klaineana*, both from the African sect. *Pachylobus*, are epigeal. It would be very interesting to study also the germination of the Asiatic sect. *Tenuipyrena*.

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